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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/525,693 | 07/18/2005 | George G. Chase | 089498.0444.US | 7057 |
| 39905 | 7590 | 03/01/2011 | EXAMINER | |
| Daniel J. Schlue Roetzel & Andress 222 S. Main St. Akron, OH 44308 | | | NELSON, MICHAEL B | |
| | | | ART UNIT | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/525,693 | Applicant(s) CHASE ET AL. | |
| | Examiner MICHAEL B. NELSON | Art Unit 1798 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/08/10 has been entered. Claims 1-21 are currently under examination on the merits. The previous 112 2nd paragraph rejection is withdrawn due to applicant's amendments. The previous 112 1st paragraph rejection is withdrawn due to applicant's arguments (See Response to Arguments below).

Examiner's Note

2. The use of produce-by-process limitations has been noted in claim 1, such as, for example, "electrospun." Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself. In re Thorpe, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). As the court stated in Thorpe, 777 F.2d at 697, 227 USPQ at 966 (The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.).

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Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 17, 19, 21 rejected under 35 U.S.C. 102(e) as being anticipated by Senecal et al (U.S. 2001/0045547).

5. Regarding claim 1, Senecal discloses an electrospun nanofiber made by spinning fiber precursor material (polyacrylonitrile) doped with optical materials (photo reactive compounds) into the solution before spinning (i.e. precursor materials) ([0023]).

6. Regarding claim 2, the fibers produced are polymeric (polyacrylonitrile) ([0023]).

7. Regarding claim 17, the fibers are used in an energy conversion system (i.e. disclosed as being photoelectrically converting, [0023]).

8. Regarding claim 19, the fibers are laid down on a surface to create a non-woven fabric ([0023]).

9. Regarding claim 21, the optical material or optical precursor (i.e. the photoreactive compound) is incorporated into the solution before the electrospinning ([0023]).

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Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Senecal et al. (U.S. 2001/0045547) as applied to claim 1 above.

14. Regarding claims 9-14, Senecal discloses that the amount of optical agent (photoreactive compound) is added at 10-60% which overlaps a portion of all the claimed ranges ([0023]).

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While this does not exactly match the claimed ranges, one having ordinary skill would have found it obvious to have adjusted the amount of photoreactive compound in the solution to control the concentration of the compound in the fibers and thereby control the concentration of the compound in the resulting fiber membrane to optimize the degree of photoreactivity while minimizing costs.

15. Claims 1-5, 7, 8, 15, 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. (U.S. 5,356,487) in view of Winter et al (U.S. 3,846,527) and further in view of Dzenis (U.S. 6,256,333).

Regarding claim 1, Goldstein et al. discloses a ceramic burner which utilizes a variety of inorganic fibers containing various rare earth compounds (See Abstract) to emit infrared radiation as a thermophotovoltaic device (C2, L5-15). The fibers are disclosed as being nanometer fibers (C5, L30-C6, L5) and smaller diameter fibers (less than one micron) are disclosed as being preferred because they heat and cool more rapidly than larger fibers.

Goldstein discloses that one way of producing these fibers is to coat inorganic fibers with a solution containing the optical metals (C5, L50-C6, L5). However, Goldstein does not disclose using the optical compounds in a solution (as precursors) to form the fibers themselves. Winter discloses that inorganic fibers containing rare earth metals (like those used in Goldstein) can be produced by incorporating the metals into a polymeric solution and spinning the solution to form fibers and then heating the fibers to turn the polymer into inorganic material (See Abstract, C2, L55-65, C3, L30-C4, L35). Hence it would have been obvious to have incorporated the metal particles into the fibers rather than coating the already formed fibers with a solution because to

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do so would reduce the number of steps required to make the fibers and would incorporate the metal compounds throughout the fiber more efficiently and uniformly.

Goldstein and Winter do not disclose that the fibers be electrospun; however, Dzenis discloses that when small size fibers are called for (as in Goldstein, C5,L50-C6, L5) the new technology of electrospinning can be used to spin the polymer solution in the presence of a high voltage electrical field which helps to elongate and accelerate the solution and produce fibers of a very small diameter (5 nm-5000 nm) (C8, L10-40). Hence one having ordinary skill would have used the electrospinning process, as taught by Dzenis, to spin the doped solution containing the optical metal rare earth elements, as taught by Winter, in order to make the inorganic rare earth containing nano-fibers, which were called in Goldstein.

Regarding claim 2, the fibers disclosed by Winter are polymeric and also carbon fibers and ceramic fibers in that they are polymeric before they are heated but then become carbon fibers with ceramic particles after they are heated (C5, L10-40).

Regarding claim 3, 4, 5, titanium oxide and rare earth metals and their oxides (among others) are the metals disclosed to be doped into the solution before spinning (C5, L10-35). Rare earth metals include europium and gadolinium (among others).

Regarding claim 7, 8, 15 and 20, the rare earth metals used in Winters (C5 L10-35) include some of the specific rare earth metals called for in Goldstein (C5, L50-C6, L10) which are disclosed in Goldstein are producing a measurable IR emittance when exposed to thermal energy (C2, L5-30).

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Regarding claims 17-19, the use of the fibers in Goldstein involves stacking the fibers into a layer thereby forming a fabric (C5, L30-50) for the overall use as a thermophotovoltaic energy conversion device (C2, L5-30).

Regarding claim 21, the optical materials (rare earth oxides) of Winter are incorporated into the polymer spinning solution prior to being spun (See Abstract, C2, L55-65, C3, L30-C4, L35).

16. Claims 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. (U.S. 5,356,487) in view of Winter et al (U.S. 3,846,527) and further in view of Dzenis (U.S. 6,256,333), as applied to claim 1 above, and further in view of Rubinstein (U.S. 3,881,962).

Regarding claims 6 and 16, modified Goldstein does not disclose a catalyst however, Rubinstein discloses catalysts can be added to ceramic burners which allow for releasing of energy at much lower energies with the fuel air mixture reacting with the catalyst to release heat (C5, L15-60). Hence it would have been obvious to have utilized these ceramic materials with the metals in Winter in order to reduce the temperature at which energy is released. Regarding the chemical sensor limitation, the burner of Goldstein is already (and would still be with the ceramics of Rubinstein) a chemical sensor in that it reacts to a fuel air mixture at the correct temperature (Goldstein, C2, L5-20).

17. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goldstein et al. (U.S. 5,356,487) in view of Winter et al (U.S. 3,846,527) and further in view of Dzenis (U.S. 6,256,333), as applied to claim 1 above, and further in view of Milstein (U.S. 3,881,962).

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18. Regarding claims 9-14, Goldstein does not disclose the ranges as instantly claimed; however, Milstein discloses that for ceramics which emit IR energy in the presence of heat, a mixture of ytterbium and aluminum (ranging from 0-90% ytterbium) can be used to produce different levels of efficiencies, with different mechanical properties for certain types of photodetectors (different rare earth metals being able to be used in place of Ytterbium) (C3, L50-55, C4, L1-15, C4, L55-67, C5, L1-10). Hence it would have been obvious to have altered the mixture of the optical rare earth material to the other fiber material in order to control the efficiency of the material with different types of photodetectors and to balance the photoemission properties with the mechanical properties.

Response to Arguments

19. Applicant's arguments of 12/08/10 are considered moot in light of the new grounds of rejection presented above. Arguments which are still deemed valid are addressed below.

20. Applicant's arguments against the 112 1st rejection in the previous office action are persuasive. Accordingly, the examiner will take support for the optical precursor compound to derive from the general "optical materials" being incorporated into the solution. Hence any material added to the solution is considered a precursor in that it later becomes part of the fiber.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL B. NELSON whose telephone number is (571) 270-3877. The examiner can normally be reached on Monday through Friday 6AM-4:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on (571) 272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MN/
02/18/11

/SOPHIE HON/
Primary Examiner, Art Unit 1798